A REVIEW OF ENERGY EFFICIENCY IN ALBERTA

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A Study Conducted by:

T. J. McCann and Associates

With the assistance of:

Energy Efficiency Association of Alberta

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This paper has not been reviewed by the Clean Air Strategic Alliance Board of Directors and therefore does not necessarily reflect the views of the Alliance. No endorsement should be inferred.

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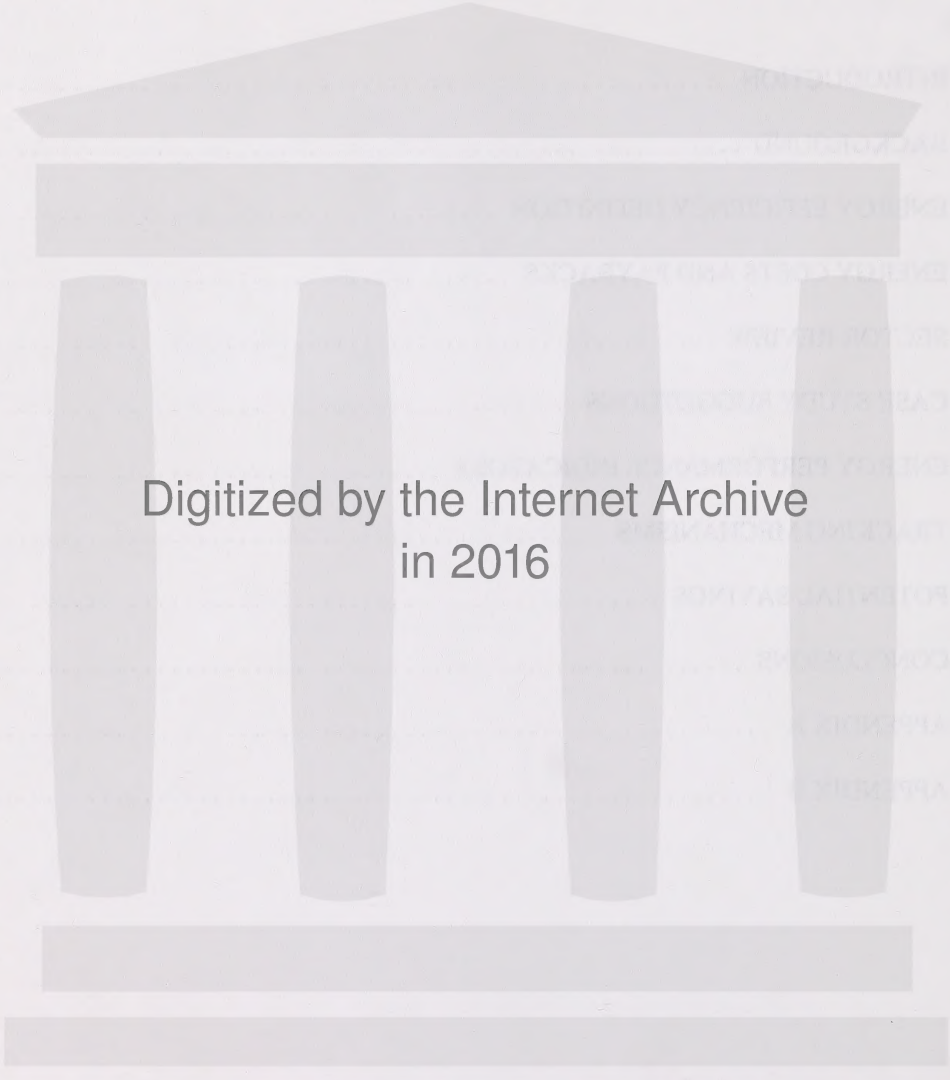

1.0 INTRODUCTION

This report represents the findings of a recent review of energy efficiency activity in Alberta. The study had been requested by the Clean Air Strategic Alliance (CASA) and was coordinated by an energy efficiency advisory committee with the Alberta Department of Energy as the lead agency.

Work on the study started in mid-March and was completed by the end of May 1997. A summary of the findings was presented verbally by the three-person study team at a meeting organized by the Alberta Department of Energy on June 3, 1997. A major product of the study is a spreadsheet that documents the majority of the interviews that took place.

Most of the information that formed the basis of this study came from key individuals in the four energy utilization sectors in Alberta (industrial, commercial, residential and transportation). The four main sectors were divided into 23 subsectors to ensure that no significant group was omitted. Using a contact list that contained over 100 names, 91 actual telephone interviews (or in-person interviews in some cases) were conducted. Three different sets of questions were used with the most appropriate set used for the particular person being interviewed.

A progress report was submitted on March 27, 1997. The progress report listed the names of prospective contacts, the three sets of questions to be used, a description of the approach to be taken on the study and a description of the progress on the first few interviews.

Toward the end of the telephone interview period, more detailed in-person interviews were conducted with selected individuals from the major sectors. These "expert" interviews helped establish the conclusions that are summarized in this final report.

The study was conducted with T. J. McCann and Associates Ltd. (McC•A) taking the lead role, assisted by the Energy Efficiency Association of Alberta (EEAA).

2.0 BACKGROUND

This study stems from a CASA Board of Directors meeting in November 1996. It had been determined that a study was needed to:

- identify what level of energy efficiency exists in specific sectors of Alberta;
- identify what energy efficiency activities are currently being implemented in Alberta;
- identify what energy efficiency activities are being planned in Alberta;
- develop a database which establishes a baseline and could be used to track future progress;
- identify gaps in the delivery of energy efficiency initiatives and the potential opportunities for energy efficiency activity in Alberta; and
- recommend initiatives which are practical and which cost-effectively capture potential opportunities.

The study was to look at any programs or initiatives that have or could have a significant impact on reducing energy use in Alberta. The programs or initiatives could be either one-time or on-going. Activities that have other objectives and reduce energy use coincidentally were not to be surveyed as part of this study.

Results were to be reported according to the four main energy utilization sectors. The analysis was expected to:

- compare macro trend of energy efficiency and energy end use in Alberta, as a whole and for each sector, over the last five years;
- determine level of activity in each sector in relation to cost-effective opportunities;
- identify specific cost-effective opportunities at the micro level and provide suggestions on taking advantage of the opportunities; and
- review energy efficiency goals of CASA 1991 Report to the Ministers and identify progress and gaps. (This requirement was subsequently dropped)

In conducting the study the following tasks were required:

- contact the phone list provided by the Alberta Department of Energy;
- follow-up with additional phone calls to a sufficient number of contacts to identify the major activities in each sector;
- use existing reports and personal conversations with at least three experts from each sector to estimate the cost-effective potential for, and the current level of, energy efficiency in Alberta;
- build a database using the information collected from phone conversations and follow-up information;
- suggest performance indicators and a tracking mechanism which could be easily implemented with the database;
- based on the database results identify opportunities for energy efficiency initiatives in Alberta, and identify at least ten success stories; and
- make at least ten specific recommendations for cost-effective, practical initiatives which will take advantage of the opportunity areas. (This requirement was subsequently dropped)

3.0 ENERGY EFFICIENCY DEFINITION

For the purpose of this study, energy efficiency was considered to be a decrease in the units of energy used by a consumer through an intentional effort to decrease energy use as an efficiency measure. Reducing energy cost was the only motivating factor reported by the participants in this study, although some individuals who where interviewed noted occasional other benefits.

Related to the cost saving objective is the reduction in electric demand, usually through equipment replacement or by using a control system or a procedure to turn off non-essential electrical loads during periods of peak demand. Such actions are considered to be energy efficiency because they usually also result in a significant reduction in energy use. Power factor correction is also considered to be energy efficiency, although the energy reduction is usually more pronounced at the point of generation.

Alternating utility rates may save money but this is not considered energy efficiency. Similarly, conversion from one form of energy to another may save money but could increase overall energy use. Co-generation can be considered energy efficiency if the electricity that is generated replaces purchased electricity.

In all cases, reduced energy use results in reduction of greenhouse gas emission to the atmosphere. However, greenhouse gas reduction strategies such as reducing methane emission or carbon dioxide capture are not energy efficiency. Similarly, offsets such as lower cost actions elsewhere are not accounted for in this study even if those actions involve energy efficiency.

4.0 ENERGY COSTS AND PAYBACKS

The majority of study participants either reported or implied that their cost of purchased energy was not high enough to warrant any special attention to energy efficiency. Natural gas prices are known to be very much lower in Alberta than elsewhere and this results in little interest in efficiency. Electricity is sold through a price structure that is often misunderstood and is too complex for most consumers to care about. There was virtually no interest in reducing vehicle fuel cost. More than one participant commented that our access to abundant energy resources affects the level of interest in energy efficiency in Alberta.

A study done in 1995 by McC•A for a gas utility consortium determined that energy costs are treated seriously in some industries. By attempting to correlate an industry's ratio of energy cost to value-added against its level of interest in energy efficiency it was found that those industries with a high ratio were already efficiency-oriented. In those industries, the cost of energy represented a significant cost of production and that cost could not be overlooked. The level of interest in energy efficiency decreased as the ratio decreased. Some of the specific ratios determined in this 1995 study are given in Appendix A on page 40. The findings of the current study regarding the level of interest in energy efficiency are consistent with those of the earlier study.

Most companies in the industrial sector have extremely demanding payback requirements on energy efficiency projects. A one year payback (100% return on investment) is not an unusual requirement. There was very little interest in anything beyond two years. On the other hand, some of those interviewed felt that their facilities in the hydrocarbon process industries were designed to meet efficiency standards elsewhere and are more efficient than Alberta's energy prices would require.

There is no comparable energy cost analysis for the non-industrial sectors other than very broad figures from Statistics Canada. An energy cost analysis could be done at today's prices for a wide range of commercial and institutional subsectors using Energy Bus audit results (2400 facilities throughout Alberta), but such an analysis is beyond the scope (and budget) of the current study.

Payback expectations in the commercial sector vary as widely as do the types of facility in this sector. Those individuals who are involved in publicly funded facilities will consider project paybacks of up to five years, although most of those noted that capital funds are rarely available. The Provincial Government makes no capital funds available for energy saving projects at its facilities and has only used outside sources of financing on a few occasions.

In the commercial private sector, paybacks generally do not go beyond two years. However, private sector organizations have been willing to allow some bundling of projects and outside financing so longer paybacks can be offset by quick payback projects. Energy performance contractors have had some success developing energy cost reduction projects in the commercial building sector.

There is no known energy cost analysis for the residential housing sector. Although the residential sector is a significant energy user in total, individual houses use very little energy. Some individuals go to great lengths in their conservation practices at home but those individuals are the exception, not the rule. Payback expectations are difficult to assess. Although most homeowners probably expect to remain in their current home for at least a few years, there are not likely very many who are willing to spend a significant amount of money on energy efficiency.

There is also no known energy cost analysis for the transportation sector. Very little interest was expressed by those who were interviewed in reducing vehicle fuel usage. Even those who claim to have active energy management programs appear to overlook vehicle fuel. There are no specifics on payback expectations in the transportation sector.

5.0 SECTOR REVIEW

The next 30 pages summarize the findings of the interviews. The four main energy utilization sectors were subdivided into 23 subgroups to allow differences in the perspective of those subgroups to be identified. Even within subgroups there was a cross-section of viewpoints, and consensus was rarely found. However, a dominant theme emerged from each group and it is that theme that is reported in this section. If the range of viewpoints is significant, the range is reported. The headings differ between groups because three different questionnaires were used. Heading abbreviations and key words are used to save space. The full questions can be found in the questionnaires that were included with the progress report. Only the results that are significant are reported. The answers to all of the questions can be found in the database.

Of the 91 interviews that took place in conducting this study, 68 were sufficiently detailed and complete enough to be entered in the database. Individual database entries were brought together in the groups that are reported in this section.

OIL AND GAS INDUSTRY

Contacts:
- CAPP (Webster/Price).
- PetroCan (Michelussi).
- Suncor (McVicar).
- Various others, mostly in smaller companies.

Associations:
- Canadian Association of Petroleum Producers (CAPP).
- Small Explorers and Producers Association.

Active Programs:
- Companies that represent 85% of Canadian oil production have registered with the Voluntary Challenge Registry (VCR) and many have developed action plans (the oil and gas industry is probably Canada's most active participant in the VCR program).

Savings:
- Sector representatives claim an efficiency improvement of about 1% per year.

Intensity:
- CAPP has done an energy intensity analysis that shows a general downward trend in recent years.

Potential:
- A previous RTM study identified 8-10% achievable ratings of which over half have now probably been achieved. Additional opportunities are likely.

Notes:
- Reducing methane emissions is now more important than energy efficiency in many of the larger companies.
- Energy intensity may increase in the future with increased production of heavy crude/bitumen.
- Imperial Oil is considering co-generation at Cold Lake.

Needs:
- CAPP has identified a need for workshops and simple literature.
- CAPP could use some help getting to small companies.
- Also need to get to SEPA members.

OIL SANDS AND UPGRADING

Contacts:
- Ongoing rapport with Suncor (and Syncrude to a lesser extent).

Associations:
- Report to Canadian Petroleum Products Institute (CPPI) energy reporting [via Canadian Industrial energy End-Use Data and Analysis Centre (CIEEDAC)].
- Report to Canadian Industry Program for Energy Conservation (CIPEC) via above.
- Companies generally work on their own as each is relatively unique.

Active Programs:
- Strong top management commitment to efficiency programs.
- Involved in VCR with active energy efficiency programs.

Savings:
- Over 1% per year.

Needs:
- Little outside help needed.

PIPELINES

Contacts:
- CEPA (B. Stowkowy).
- NOVA (L. Stiartowski).

Associations:
- Canadian Energy Pipeline Association (CEPA).

Active Programs:
- Both oil and gas pipeline companies have had active energy efficiency programs as part of their VCR commitment.

Savings:
- Companies claim significant reduction in energy use per unit of throughput.

Potential:
- Probably already close to maximum efficiency.

Note:
- Total energy increasing due to increased throughput.

Needs:
- Already well organized regarding energy efficiency.

CHEMICAL INDUSTRY

Contacts:
- CCPA's Edmonton representative.

Associations:
- Canadian Chemical Producers Association (CCPA).

Active Program:
- Very committed to CIPEC and VCR.
- A world leader in environmental stewardship.

Savings:
- Committed to and achieving 1% per year improvement.

Intensity:
- Varies greatly, plant to plant.

Potential:
- Plants are at or above economic efficiency potential.

Needs:
- Probably none, but open to ideas.

FOREST PRODUCTS

Energy costs are not considered high except for diesel. Industry will only consider quick payback projects due to many ups and downs.

Industry has active environmental programs (Forest Care) but energy efficiency is not yet included. Neil Shelly of the Alberta Forest Products Association would like to offer some meaningful energy program to members and could use some help. Some technical reference material already exists.

PULP AND PAPER

The Canadian Pulp and Paper Association (CPPA) and some members support the VCR program but the level of support among Alberta members is not known. Only two or three Alberta mills are members of CPPA. The industry is not nearly as advanced in their efficiency planning as is the oil and gas industry although there is good energy efficiency data available and some known case studies. A survey of the Alberta mills would be useful.

CEMENT

Contacts:
- Lafarge (M. Palwiuk).
- Inland (various).

Data:
- With only two plants in Alberta, data is considered to be confidential.
- Energy efficiency is known to be a major concern and most efficiency opportunities are pursued, usually during periods of major process changes.

COAL MINING

Associations:
- Coal Association of Canada.

Programs:
- Major companies have active programs and some savings are being realized.

OTHER INDUSTRY (includes some industrial sectors reported above)

Six individuals were contacted, one from the Alberta Food Processors Association, and two from food industry companies. There was one contact with the Forest Products Association and one from a forest product company. There was also one contact with the Canadian Chemical Producers Association.

Active Program:
- None of the associations or companies had energy efficiency programs.
- The Chemical Industry Association representative knew that many of its members had active programs but did not know the details.

Fit:
- Mainly at the operations and maintenance level, although senior management was aware in some cases.

Statement:
- Only one representative claimed to have a statement (although no program).
- Others felt that it is implied within environmental statements.

Priority:
- Low to medium.

Projects treated:
- Four indicated that projects are treated the same as other expenditures.
- Two indicated that there are more demanding expectations.

Payback:
- Most did not know.
- One indicated less than two to three years.
- One indicated up to five to seven years is acceptable.

Typical of others:
- Four of six indicated their level of interest is typical.
- Two others did not know.

Motivation:
- Cost is the only major factor.
- Emission issue has potential to become important.
- Image is important but a low priority.
- Comfort is not an issue.

More motivation:	• Higher prices and more savings opportunities. • Better demonstration of impact on bottom line. • Bigger public perception of emission issue. • More recognition.
Savings %:	• No figures given for savings.
Potential %:	• 3-20% (11% average) for electricity indicated by three representatives. • 3-10% (7.7% average) for gas indicated by three representatives. • 10% for vehicle fuel indicated by one representative.
Target:	• None had targets although it was indicated that some association members might have.
Internal/out sourcing:	• Current activity is mostly planning and is being done internally.
Audit:	• Some audits have been done but many years ago.
Findings:	• Not known.
Not implemented:	• Not known.
Intensity:	• Not presently calculated but should be based on production quantity.
Suppliers:	• All have been contacted by suppliers of hardware, services and chemicals. • Products and services are good, but not in demand. • Need to demonstrate better economics.
Utilities:	• Most had been contacted by electric utilities. • Information is not applicable. • Should offer rate alternatives. • Should offer help for conducting a self audit.
Government:	• Only minimal contact.
VCR:	• One company representative and some association members are involved.
Training:	• No.
Collaboration:	• Some yes, some no. • Would need to be convinced of benefit.
Benefits:	• Produce and distribute good factual information.
CASA:	• One yes, others not familiar with CASA.

Notes:
- Energy efficiency varies greatly among industry sectors. Unfortunately, no companies contacted had active programs but some planning appears to have started.
- None of the three associations have an active role in energy efficiency but are well positioned to assist their members.

Needs:
- Industry associations need to be recruited into helping promote energy efficiency among their members.

COMMERCIAL BUILDINGS

Six individuals were contacted. Two contacts represent building associations [Building Owners and Management Association (BOMA) and International Facility Management Association (IFMA)]. One contact is with a large office/retail facility management firm (Oxford). One contact is responsible for a large group of utility buildings (Telus). One contact is in facility operations at a multi-building exhibition site (Edmonton Northlands). One contact maintains a specialty commercial building (Citadel Theatre).

Active program:
- Yes, four out of six.

Fit:
- There is knowledge of program activity at the highest corporate level in the four organizations although energy efficiency is considered a building operations function.

Formal statement:
- Some members of BOMA may have one.
- Others either do not or is implied through other goals.

Priority:
- Energy efficiency priority ranges from low to high.

Projects treated:
- Project costs are usually treated the same as other investments.

Payback:
- Less than five years is expected.

Typical of others:
- All considered their interest in energy efficiency the same as others in their sector.

Motivation:
- Cost savings are the most important motivation factor.
- Comfort problems are also identified as being important.
- Public image was acknowledged as a factor of less importance.
- All were aware of the greenhouse gas issue but it is not a motivation factor.

More motivation:
- Motivation to save energy would increase with higher prices, better access to capital, better project economics and more awareness of the climate change issue.

Group reporting:	• Four out of six are involved in group reporting, nationally and for internal reasons.
VCR:	• Only one thought their organization was registered in the VCR program although the association representatives expected that some of their members might be.
Savings %	• Three of six indicated that recent energy saving projects resulted in savings of 2% to 20%.
Potential %:	• Few wanted to predict what potential energy savings still exist, but those who did suggested values that range from 2% to 30%.
Target:	• None have established targets.
Intensity:	• Very little thought has been applied to energy intensity calculation.
Training:	• Training for energy efficiency is not a priority.
Internal/out sourcing:	• All use a combination of internal resources and contractors for project implementation.
Audit:	• All claim to have conducted energy audits.
Findings:	• Projects include lighting, scheduling, motor replacement and water conservation.
Not implemented:	• Long payback projects are not implemented.
Suppliers:	• All have been contacted by suppliers and consultants and all felt that the private sector could do better in promoting its services. Suppliers should be better organized and use better data.
Utilities:	• Electric utilities should know their customers better and provide more specific information on available products.
Government:	• The Federal Energy Innovator program was mentioned but is generally considered ineffective.
Collaboration:	• Five out of six indicated that further collaboration among stakeholders would possibly result in more energy efficiency activity.
Benefits:	• No specifics were provided. Further ideas were generated during follow-up "expert" discussions that are reported later in this report.

CASA:
- There was no preference given to CASA as the collaboration body.

Notes:
- The commercial building sector has a long way to go in considering energy efficiency either individually or in any organized way.
- The associations that represent facility organizations are also not actively dealing with energy efficiency through any meaningful programs.
- The sector is well organized and represented through associations and would be an ideal candidate and target for a collaboration effort.

Needs:
- Business associations need to be recruited into helping promote energy efficiency among their members.
- Resolution of the Energy Code issue would be beneficial.

MUNICIPALITIES

Two individuals were contacted, one representing a large city (Edmonton) and one representing a town (Drumheller). The Alberta Association of Urban Municipalities (AUMA) declined to participate.

Active Program:
- Yes, both.

Fit:
- Public Works and all consuming departments.

Statement:
- Yes, through environmental policy in one case.

Priority:
- High.

Projects treated:
- Much differently in Edmonton because of revolving fund.
- Same as other projects in Drumheller.

Payback:
- Less than five years for Edmonton.
- Less than seven years for Drumheller.

Typical of others:
- Both are ahead of other similar municipalities.

Motivation:
- Cost is still the main motivator.
- Emission issue is becoming a close second.
- Image is growing in importance.
- Comfort is a minor concern.

More motivation:
- Lighting legislation.
- More awareness of emission issue, CO_2 credits.

Savings %:
- 3-15% (9% average) electricity.
- 3-10% (6.5% average) gas.
- 3-5% (4% average) vehicle fuel.

Potential %:	• Only Edmonton provided an estimate, of 20% electricity, 10% gas, and 10% vehicle fuel.
Target:	• No.
Internal/out sourcing:	• Planning is internal. • Major projects are contracted out.
Audit:	• Yes.
Findings:	• Mostly lighting.
Not implemented:	• Some projects slow in getting started.
Intensity:	• kWh/sq ft used for Edmonton.
Suppliers:	• Lighting and other hardware suppliers and consultants. • Need to be more timely and aware of where the organization is in its implementation.
Utilities:	• Active participation by electric utilities. • Assistance should be more specific.
Government:	• Federal level involved through Energy Innovators. • Could assist more, through the provision of case studies.
VCR:	• Only Edmonton has MOU, neither has Action Plan.
Training:	• Some training, including seminars.
Collaboration:	• Supported.
Benefits:	• Awareness and environmental impact.
CASA:	• Not well known.
Notes:	• Both contacts represent active programs and are very knowledgeable about opportunities for energy efficiency in their sector. Although ahead of others in their sector, there are other municipalities known to have active programs. • It is unfortunate that the AUMA is so uninterested in promoting the successful efforts of its members.
Needs:	• The AUMA need to be recruited into helping promote energy efficiency among its members.

HEALTH CARE FACILITIES

Three individuals were contacted, one representing PICA (Public Institutional Consumers Association), one representing a large urban hospital (University of Alberta) and one representing a regional health care authority (Lakeland).

Active Program:	• Only the U of A Hospital has an active program. • PICA expects that many of its members do but does not have that information. • Lakeland is working towards starting a program.
Fit:	• Mostly at the operations level but more recently has involved senior management (U of A Hospital).
Statement:	• None, but the U of A Hospital mission statement refers to energy efficiency.
Priority:	• Generally low and in proportion to the energy component of the budget. • Recently became a high priority at U of A Hospital.
Projects treated:	• Basically the same, each project needs to be justified.
Payback:	• Less than five years.
Typical of others:	• Some facilities are ahead of others.
Motivation:	• Cost is the main motivator. • Emission issue a factor at U of A Hospital. • Image is important but not publicized enough. • Comfort is not, but indoor air quality is.
More motivation:	• Higher energy prices and further budget cuts. • More confidence in savings projections. • More facts on emission impact or legislation.
Savings %:	• 12% at U of A Hospital. • Some peak demand savings elsewhere.
Potential %:	• 12.5-20% (16.3% average) electricity. • 10-20% (15% average) gas.
Target:	• U of A Hospital hopes to save further 20% over next two to three years.
Internal/out sourcing:	• All three indicated that a combination is being or will be used.

Audit:	• Some.
Findings:	• Lighting, power factor, DDC, VFDs, peak shaving, free cooling (U of A Hospital).
Not implemented:	• Long payback VFDs and generator conversion.
Intensity:	• kWh/sq ft used, but can be misleading.
Suppliers:	• Lighting and other hardware suppliers and ESCOs. • Need to know more about their customers and to provide more confidence in savings projections.
Utilities:	• All have been contacted by electric utilities with some useful information, pamphlets and promotion of services. • Utilities should do site inspections and provide pricing alternatives.
Government:	• U of A Hospital approached by Energy Innovators. Energy Innovators seem to push performance contracting too much.
VCR:	• U of A Hospital in VCR. The other two are not aware of it.
Training:	• Some formal and supplier training.
Collaboration:	• Supported by two of three.
Benefits:	• Establish targets.
CASA:	• Supported by two of three as a suitable collaboration group, but CASA was not well known.
Notes:	• Some, like U of A Hospital, are definite leaders in energy efficiency and others are just getting started. • PICA is well positioned to provide information and a coordinating role on energy efficiency but that assistance is not being requested by its members.
Needs:	• PICA and other associations that represent health care facilities should be recruited into sponsoring training and other energy efficiency services.

EDUCATION FACILITIES

Six individuals were contacted, one representing the Provincial Education Department, one from the Alberta School Boards Association (ASBA), two from public school boards, one from a community college and one from a university.

Active Program:	• All indicated that they have an active energy efficiency program either internally or through members (ASBA).
Fit:	• Varies from operations, planning and management.
Formal Statement:	• Generally none, except for one school board. • Part of "Operations" mission statement (University).
Priority:	• Medium to high priority but always secondary to education needs.
Projects treated:	• Competes equally with other necessary projects.
Payback:	• Up to five year paybacks are considered.
Typical of others:	• Most felt that the level of interest was similar.
Motivation:	• Cost seems to be the only factor. • Only one of six mentioned emission reduction and when mentioned, it was only as a spin-off benefit. • Image and comfort have not been factors.
More motivation:	• Legislation; carbon tax mentioned by one.
Savings %:	• 12.5-35% electricity (25.8% average). • 12.5-35% gas (24.2% average).
Potential %:	• 10-22.5% electricity (14.2% average). • 10-22.5% gas (16.3% average).
Target:	• Three indicated electricity targets of 10-25%. • One indicated gas target of 15%. • Reached within two to ten years.
Intensity:	• kWh/sqft used at university. • Others prefer cost factor (eg. $/sq m).
Internal/out sourcing:	• Combination.
Audit:	• All facility representatives have done audits.

Findings:	• Lighting, motors, HVAC, power factor, DDC.
Not implemented:	• Long paybacks.
Suppliers:	• ESCOs, hardware suppliers, water conservation. • Need to show what works. • Prices seem to be at a premium. • University generally happy with suppliers.
Utilities:	• Contacted by electric utility only. • One would like real time analysis.
Government:	• Two were contacted by federal agencies (NRCan and FBI). • Would like to see information ideas and seminar.
VCR:	• Two are in VCR but visibility limited.
Training:	• Some have short seminars.
Collaboration:	• Supported by all six.
Benefits:	• Objective information, facilitates cooperation. • Capital pool.
CASA:	• Most are not familiar with CASA.
Notes:	• The individuals contacted are knowledgable and have good energy efficiency experience. • The ASBA and PICA are both in a good position to help but have no programs.
Needs:	• The ASBA and PICA should be recruited into a cooperative effort to provide meaningful information on energy efficiency to their members.

AGRICULTURE

Three individuals were contacted, one with the Alberta Department of Agriculture, one with the Olds College and one with the Agriculture Canada research facility in Lacombe.

Active Program:	• Yes (all three).
Reason:	• Cost reduction in farming and production.
Current Activity:	• Reduced (Alberta Agriculture).
Projection:	• Slight increase expected (Alberta Agriculture).

If discontinued:	• Increase agriculture production cost.
Statement:	• No formal statement on energy efficiency.
Priority:	• Important but not urgent.
Projects treated:	• Differently because of important research projects (Agriculture Canada).
Payback:	• Three to five years (Agriculture Canada).
Cost:	• Budgeted, not recouped (Alberta Agriculture).
Typical of others:	• Yes (all three).
Motivation:	• Cost is highest priority (all three). • Emissions and comfort are not factors. • Image could play an increasing role.
More motivation:	• Energy price increase. • Emission issue needs promotion.
Savings %:	• Not known.
Potential %:	• 10% (Agriculture Canada). • 0% (Olds College), savings already achieved.
Target:	• Plan to develop a target (Agriculture Canada).
Intensity:	• None used.
Internal/Out sourcing:	• Both.
Audit:	• Both by Agriculture Canada and Olds College.
Findings:	• Lighting, VSDs.
Not implemented:	• Long payback projects.
Suppliers:	• Ballasts, motors, motor drives. • Suppliers should be more accurate and honest.
Utilities:	• Agriculture Canada approached by electric utility. • Utilities should do more seminars.
Government:	• No contact.

VCR:	• Not involved, not optimistic of any results.
Training:	• Some done but no specifics given.
Collaboration:	• One yes, one no.
Benefits:	• No suggestions. • Encourage good communication.
CASA:	• Not familiar with CASA.
Notes:	• Individual farms were not represented in the survey but the three individuals contacted were probably as aware as anyone of the importance of energy efficiency to farmers. There was nothing specifically mentioned about any special interest in energy efficiency among farmers. • Energy efficiency is of modest interest at the facilities of Olds College and Agriculture Canada. • Energy efficiency is not an important concern at Alberta Agriculture.
Needs:	• The role of energy efficiency in farming needs to be studied so that the appropriate collaborative efforts can be initiated.

HOUSES

Four individuals were contacted, one representing the Alberta Home Builders Association, one from TransAlta's Energy Matters information service, one who is a residential energy consultant and one who is involved in the R2000 program.

Active Program:	• All indicated they have an active energy efficiency program aimed at informing the public.
Current Activity:	• Much the same (some activity increasing, some decreasing).
Future:	• Much the same but some growth expected.
If discontinued:	• No similar service would replace.
Formal Statement:	• None.
Priority:	• Varies.
Costs:	• Utility and government support with some private sector support.
Typical of others:	• Only reach a small portion of the market.

Motivation:	• Cost and comfort factors are highest. • Emissions considered important but the public does not relate personally. • Image is secondary but important.
More motivation:	• Better products at lower prices. • Education to bring emission topic to a personal level. • Demonstration projects would help image motivation.
Payback:	• Rate of return is not always a priority.
Savings %:	• Varies, 5% for retrofits, up to 32% for R2000.
Potential %:	• No estimate provided.
Target:	• None.
Intensity:	• No standard factor used.
Suppliers:	• Consultants and hardware suppliers.
Utilities:	• No contact.
Government:	• No mention of any contact.
VCR:	• None registered.
Training:	• Builders' workshops.
Collaboration:	• Three of four supported.
Benefits:	• Disseminate information on programs.
CASA:	• One indicated there is a role for CASA.
Notes:	• The individuals contacted are knowledgable and dedicated to energy efficiency in the housing sector. • There is willingness to collaborate; perhaps more meaningful results can be achieved through combined efforts.
Needs:	• Dialogue and better coordination of services between utilities. • Resolution of the Energy Code issue would be beneficial.

APARTMENTS

Two individuals were contacted, one representing an apartment association with a wide range of members (Edmonton Apartment Association) and the other representing a single company that operates numerous large and small apartment buildings (Midwest Property Management).

Active Program:	• One no (association), one yes (company).
Fit:	• No fit (association), all levels involved (company).
Formal Statement:	• None.
Priority:	• Not high at present, but has potential (association). • As important as any other cost (company).
Projects treated:	• Same as other costs.
Payback:	• 12 to 36 months required.
Typical of others:	• Probably about the same.
Motivation:	• Cost and comfort are highest. • Environmental impact may be of some influence. • Image has not been a factor but could be.
More motivation:	• Projects that are easier to implement. • Public education on greenhouse gas issue.
Savings %:	• Not known.
Potential %:	• Don't know (association). • Greater than 20% (company).
Target:	• None.
Intensity:	• Has not been determined, although kWh/sqft is OK.
Internal/out sourcing:	• All contracted out.
Audit:	• Some members have had audits done (association). • Yes, all buildings audited (company).
Findings:	• Lighting, heating, water.
Not implemented:	• All long payback projects.

Suppliers:	• Consultants, ESCOs and hardware suppliers. • Need better information, better organized, more follow-up.
Utilities:	• Contacted by electric utility only. • Should provide factual examples (association). • Should not have active role (company).
Government:	• No contact.
VCR:	• Not involved, don't know about it.
Training:	• None.
Collaboration:	• Supported.
Benefits:	• Education and possible incentives.
CASA:	• Don't know about CASA.
Notes:	• The newly formed Edmonton Apartment Association represents a good vehicle for dialogue on energy efficiency and for disseminating information.
Needs:	• Recruit the Edmonton Apartment Association and other similar associations in other locations to promote energy efficiency among their members.

TRANSPORTATION

Five individuals were contacted, two from provincial government departments (Alberta Environmental Protection and Alberta Transportation), one from the Alberta Motor Association, one who is involved in the SMOG Free program and one who markets the Fuel Economy Calculator.

Active Program:	• Three of five indicated some activity related to fuel economy.
Reason:	• Air emissions and cost.
Current Activity:	• Some growth but one stable and one shows a decrease.
Projection:	• Some growth expected but one expects a decline.
If discontinued:	• No significant effect noted.
Mandate:	• No formal mandate.

Priority:	• Medium.
Projects treated:	• Quick payback is expected.
Payback:	• No information given.
Cost:	• Government costs are budgeted and not recouped.
Typical of others:	• Average.
Motivation:	• Cost, emissions, image and comfort all rated as important motivators.
More motivation:	• Energy prices and taxes. • More motivation from government regarding emissions.
Savings %:	• No information, although one indicated small effect.
Potential %:	• One indicated 5% possible.
Target:	• No targets.
Internal/out sourcing:	• All internal.
Audit:	• No audits are currently done.
Intensity:	• L/100 km is generally used.
Suppliers:	• Occasionally, but with questionable benefits.
Utilities:	• Gas utility offers information on Natural Gas Vehicle (NGV) conversion.
Government:	• No known program.
VCR:	• No direct involvement but benefits expected.
Training:	• None.
Collaboration:	• All supportive of collaboration.
Benefits:	• Awareness.
CASA:	• No suggestions.

Notes:
- The AMA only responds to member inquiries but is in an excellent position to sponsor meaningful fuel saving activity.
- Provincial government departments have some interest in transportation fuel matters but not in any meaningful action.
- SMOG Free has failed to incorporate any meaningful fuel economy features into its program.

Needs:
- The AMA needs to be recruited into sponsoring a meaningful information program on vehicle fuel efficiency for its members.
- SMOG Free needs to incorporate meaningful fuel efficiency information into its services.

UTILITIES

Six individuals were contacted, two each from two separate electric utilities and two from separate gas utilities.

Active Program:
- The electric utilities operate active programs.
- Gas utilities have no formal public programs.

Reason:
- Customer service; meeting customer expectations.
- To remain competitive.
- Load management.
- Environmental benefits.

Current Activity:
- Electric utilities have seen a decrease in activity, although one individual reports an increase.

Projection:
- Three of four electric representatives expect a decrease and one predicts an increase.

If discontinued:
- Reduction in customer satisfaction.

Mandate:
- Customer expectations.

Priority:
- Low end.

Cost:
- Program costs have historically been included in total cost of service.
- Attempts are being made to recoup costs from customers.

Typical of others:
- Information and education programs are similar, other programs have unique features.

Motivation:
- Cost is the major factor.
- Emissions and image are sometimes important.
- Comfort is not a factor.

More motivation:	• Energy price increases. • Strong public pressure.
Savings %:	• 15-30% (19% average) for electricity based on five answers. • 20% for gas based on one answer. • 7.5% for vehicle fuel (own fleet).
Potential %:	• No information was provided.
Target:	• None.
Intensity:	• kWh/sq.ft. is generally OK. • Energy Bus stats are useful.
Collaboration:	• Generally supported but sceptical.
Benefits:	• Improved working relationship with ESCOs. • Encourages good communication.
CASA:	• No comments.
Notes:	• Utility programs are superior to government energy efficiency efforts and have a more direct influence through their existing business arrangements with customers. • Deregulation is contributing to competitiveness and could translate into reduced cooperation by utilities in CASA-type collaboration. • The lack of interest by gas utilities is hurting prospects for energy efficiency collaboration. • New initiatives will probably not be successful without the major commitment and involvement of utilities.
Needs:	• A mechanism to promote utility dialogue and cooperation in a deregulated environment.

GOVERNMENT

Three individuals were contacted, one representing the Provincial Energy Department, one from the Alberta Public Works Supply and Services (APWSS) Department and one from Natural Resources Canada.

Active Program:	• All indicated they have an active energy efficiency program and they encourage others to conserve.
Reason:	• Supports emission reduction objective and makes good business sense.
Current Activity:	• Increased activity compared to recent past.
Projection:	• Continued increase in program or other activity.
If discontinued:	• Increased emissions.
Mandate:	• Federal Energy Efficiency Act. • No provincial legislation but part of VCR Action Plan.
Priority:	• Not high provincially but supports climate change objective which is high priority. • Very important and growing federally.
Projects treated:	• Internally, provincial projects need to show a payback while other capital projects are budgeted.
Payback:	• Less than six years; financed externally.
Cost:	• Program costs are budgeted and not recouped.
Typical of others:	• Alberta now considers its program to be more comparable to that of other provinces, and its internal program to be ahead of others in property management. • Canada is in top 1/2 to 1/3 of Organization of Economic Cooperation and Development (OECD) countries in terms of level of effort. Federal effort greatly exceeds effort of provinces.
Motivation:	• Cost, emissions, image and comfort all rated as important motivators. Cost is the highest, except at Alberta Public Works where the emission issue is the greatest motivator.
More motivation:	• Energy prices and better knowledge of potential savings and ways to achieve them. • APWSS indicated no more motivation is necessary.

Savings %:	• Negligible internally (provincial). • No effect of provincial program. • NRCan claim 6% savings nationally.
Potential %:	• APWSS expects that large electric and limited gas savings are possible.
Target:	• APWSS has set a 9% target by the year 2000.
Internal/out sourcing:	• Combination is used at APWSS.
Audit:	• APWSS did five audits and numerous walk-throughs.
Findings:	• Lighting, HVAC controls, power factor.
Not implemented:	• VFDs and motors being done gradually at APWSS.
Suppliers:	• APWSS has been approached by hardware suppliers and consultants. • Suppliers need to continue to keep APWSS aware of capability.
Utilities:	• APWSS contacted by electric utilities only. • Utilities should be willing to aggregate accounts.
Government:	• APWSS contacted by VCR and FBI.
VCR:	• Alberta Government has filed Action Plan. • Claimed to be effective internally and externally.
Training:	• Short seminars.
Collaboration:	• Generally supported but not too optimistic.
Benefits:	• None identified.
CASA:	• CASA has already had its effect.
Notes:	• The federal program is extremely expensive and can show little in Alberta for its effort. The federal report on Influencing Energy Use in Canada reads like a defence of the federal program budget. • The provincial promotional program is non-existent. The provincial internal program has stalled and seems plagued with internal difficulties.
Needs:	• The federal government should abandon all its costly efforts to "preach" energy efficiency. • The provincial government needs to get its act together internally; it should maximize energy efficiency within its facilities and serve as a model for other public organizations and the private sector.

ENVIRONMENTAL GROUPS

Two individuals were contacted, one representing Destination Conservation (DC) and the other from the Pembina Institute (PI).

Active Program:		• Both organizations have programs that encourage energy efficiency.
Reason:		• Economic and environmental benefits.
Current Activity:		• Great increase compared to recent past.
Projection:		• Continued large growth expected.
If discontinued:		• Message would reach fewer people.
Mandate:		• Required by sponsors.
Priority:		• Extremely important component of DC but only a response to a larger issue for PI. • Very important and growing federally.
Cost:		• Mainly through sponsorship and grants. • Some fees for services.
Typical of others:		• Programs are unique and cannot be compared.
Motivation:	PI:	• Cost is most important motivator. • Emissions are a low motivator. • Image is important for some. • Comfort is not well marketed.
	DC:	• Emissions issue is the most important. • Surface disruption is also an issue.
More motivation:		• Better understanding of life cycle "costing". • Explanation of the multiple benefits of efficiency. • Regulation.
Savings %:		• DC claims 25% electricity, 10% gas. • PI program has not yet produced any savings.
Benchmarking:		• Have or will be tracking their own consumption. • Have or will be monitoring others.
CIPEC:		• Canadian Industry Program for Energy Conservation: Mixed views on benefit.

VCR:
- No benefits (DC).
- Awareness but no action (PI).

Collaboration:
- Encouraged by both.

Benefits:
- Broad push at a high level.
- Helps government with goal.
- Helps activities like Energy Awareness Week.

Notes:
- The DC program appeals to some school boards and offers direct benefits through cost savings and student participation. Its overall impact is currently limited to the school sector which represents a small portion of total energy use.
- The PI's eco-efficient communities initiative has developed very slowly and has yet to demonstrate any benefits. Continued support for this PI initiative will depend on the initial success in recruiting participants and identifying cost savings.

Needs:
- An overlap exists between environmental activities and the legitimate role of consultants. Sponsored programs like DC and eco-efficient communities should not be encouraged to deliver services in competition with consultants.

CLASSROOM EDUCATION

No new contacts were made in this sector for this study. Instead, the assessment of education resources that was done by a CASA working group in 1996 was updated and is summarized below. The 1996 assessment did not include all the information categories that were used in the current study.

Energy Efficiency Association of Alberta
- The EEAA continues to market the grade-specific energy efficiency teaching kits aimed at grades one to six. The materials used are those that were purchased from the Alberta Government upon the closure of the Energy Efficiency Branch. Although there is a well-established market and many repeat customers, there is insufficient revenue to reprint materials. The program is not sustainable as presently structured.

Alberta Power Limited
- APL developed new teaching materials in recent years and has received an international award for its education program. Separate packages of materials are available for Kindergarten to grade one, grade two and three, and grades four to six. There is also a separate package for grade nine and one for grade ten. Topics include electric generation and distribution, environmental effects, safety and energy efficiency.

TransAlta, Edmonton Power and City of Calgary Electric System

- These three electric utilities distribute a purchased information package called "Meet Your Meter", aimed at grades four to six. In addition, Edmonton Power utilizes an activity calendar, also aimed at grades four to six.

Alberta Environmental Protection

- AEP distributes a publication called "A Traveller's Guide to Spaceship Earth", aimed at grades four to nine. It links air issues and energy consumption.

Destination Conservation

- DC utilizes a comprehensive series of specially prepared education materials applicable from grades one to twelve. These materials are available to those schools that participate in the DC program.

SEEDS Foundation

- SEEDS used to produce the "Energy Literacy" series aimed at grades one to six. The series is no longer produced. SEEDS' "Learners In Action" series aimed at grades one to twelve is an environment education program in which energy efficiency is a component.

CONSULTANTS

Ten individuals were contacted, seven in Edmonton, two in Calgary and one in Grande Prairie. There was good representation from small firms, engineering and design firms, large ESCOs and controls companies.

Proportion:
- Energy efficiency 15-100% (68% average).

Current activity:
- Slight decrease (four) to double (ten), (6.0 average).

Future:
- Same (five) to double (ten), (7.1 average).

Reasons:
- Becoming more established.
- Developing new market segments.
- There is an increased awareness of services.

Importance:
- Most indicated yes, energy efficiency is important.
- A few indicated no, it's of low to medium importance.

Hard/easy:
- Eight of ten indicated that energy efficiency is a hard sell.
- One indicated it's easy.
- One indicated it's both hard and easy, depending on sector.

Motivation:	• Nine of ten indicated that cost is the most important motivator. • One indicated comfort is most important. • Emission issue is relatively unimportant. • Image is important to some clients.
More motivation:	• More savings identified. • Alternate rate structures emerging. • Access to capital. • Awareness and regulation on emission issue.
Projects selected:	• Mainly payback. • All areas of savings are considered by most. • A few looked only at high return projects.
Payback:	• Expectations ranged from less than one year to six-ten years.
Electric savings:	• 15-27.5% (22.6% average).
Gas savings:	• 15-30% (18.4% average).
Other:	• Vehicle fuel was never studied. • Some also consider water conservation measures.
Sales calls:	• 1-80% (18.6% average) of calls result in sales.
Market exposure:	• Less than 1%-50% (16.9% average) exposure to total market.
Audit important:	• Yes, all ten do audits.
Planning:	• Yes, all ten do long term efficiency planning.
Individ projects:	• Yes, all ten focus on individual projects.
Reporting:	• Six of ten help clients report to other groups.
Training:	• Eight of ten do specific product training. • Six of ten do general efficiency training.
Referrals:	• Four of ten refer clients to other specialists.
Intensity:	• Most indicated kWh/sq.ft. is useful.
Benchmarking:	• Little interest among clients other than finance.
Programs:	• Half felt utility/government programs are effective. • Other half indicated they are not effective or have a negative impact.

Utilities:
- Most acknowledged an information role for utilities.
- Most pointed out shortcomings of other utility programs.
- Should provide rate information and rate alternatives.
- Should refer clients to consultants.

Government:
- Programs like FBI not always seen as beneficial.
- Should regulate where appropriate.
- Success stories and general information would be useful.

Collaboration:
- Seven of ten indicated it would be useful or possibly useful.

Benefits:
- Information exchange, seminars, networking, and partnerships.

CASA:
- No suggestions.

Notes:
- Many consultants depend on the energy efficiency business and most are optimistic about the prospects.
- There is much scepticism about utility and government programs although most consultants maintain close liaison with utilities and government. Some consultants have benefited from utility and government programs.
- The sector is not well organized.
- Any new initiative developed through a CASA type collaborative would benefit from the recruitment of key representatives of the consultant sector.

Needs:
- A mechanism needs to be found to allow organizations that normally compete with each other to cooperate in future collaborative efforts.

SUPPLIERS

Eleven individuals were contacted of which one declined (too busy). Five of those interviewed were in Edmonton, one in Calgary and four in smaller centres. All were in product and hardware supply and contracting one.

Proportion:
- Energy efficiency 0-75% (25.7% average)

Current activity:
- Major decrease (less than 1) to major increase (8), (5.1 average)

Future:
- Major decrease (less than 1) to double (10), (5.3 average)

Reasons:
- Increased consumer awareness.
- Better economy, better technology.
- Higher cost of energy.
- Increased sales effort.

Importance:	• Most (eight) indicated yes. • Two indicated low importance.
Hard/easy:	• About half and half; some said it was getting easier.
Motivation:	• Nine of ten indicated that cost is most important. • One indicated image is most important. • Emission issue relatively unimportant except in certain cases. • Comfort does not seem to be important.
More motivation:	• Quicker returns. • Rapid depreciation.
Projects selected:	• Financial considerations. • All areas of savings considered by most. • A few looked only at high return projects.
Payback:	• Most indicated about two years although a few indicated three, five, seven and even fifteen years.
Electric savings:	• 5-25% (12.9% average) based on nine answers
Gas savings:	• 10-40% (20% average) based on four answers
Vehicle fuel:	• 12.5-40% (26.3% average) based on two answers
Sales calls:	• 5-75% (20% average) of calls result in sales.
Market exposure:	• 1-20% (8.3% average) exposure to total market.
Audit important:	• Six indicated yes, other four indicated that it will be in future.
Planning:	• Most do long term efficiency planning.
Individual projects:	• Most focus on individual projects.
Reporting:	• Seven of ten help clients report to other groups.
Training:	• Seven of ten do specific product training. • Four of ten do general efficiency training.
Referrals:	• Six of ten refer clients to other specialists.
Intensity:	• Most indicated that kWh/sq ft is useful.
Benchmarking:	• Very few clients interested.

Programs:	• Only half aware of utility/government programs.
Utilities:	• Some have benefited from utility programs. • Should offer rebates, incentives and information programs.
Government:	• Little awareness of government's role. • Most indicated an information role would be useful. • Some would like to see financing and tax incentives.
Collaboration:	• Eight of ten indicated useful or possibly useful. • One indicated that they would not deal with utilities. • One indicated that they would not deal with government.
Benefits:	• Information exchange and better customer awareness.
CASA:	• No knowledge of CASA.
Notes:	• Individual firms are benefiting from increased awareness of energy efficiency but the product supply sector is still quite small. • Some have established a good relationship with utilities and do a portion of their business as a result of utility programs. • The sector is unaware and generally suspicious of government programs.
Needs:	• A mechanism that will allow suppliers to be represented in any planning on future collaborative efforts.

6.0 CASE STUDY SUGGESTIONS

All of the interview participants were asked for their suggestions on energy efficiency case studies. Only twenty case study ideas were offered, although some individuals indicated they could find suitable case studies but did not have details at the time. The majority of case studies represent facilities that demonstrate the application of a particular technology. For the others, it was the process or the structure of the energy management program that was identified as being worthy of case study consideration.

The list of case study ideas is given in Appendix B on page 41. One is from industry, eighteen are commercial, one is residential and none were put forward from transportation. Of the eighteen commercial case study ideas, six are office buildings, four are school buildings, two are from post secondary education facilities, two are health care facilities, one is a government program, two are from the municipal sector and one is from an architectural firm.

7.0 ENERGY PERFORMANCE INDICATORS

The trend in energy utilization in Alberta is toward greater energy use both in gross terms and when expressed in a suitable intensity or unit basis (except for transportation).

From "Canada's Energy Outlook: 1996-2020" published by Natural Resources Canada (NRCan), some energy utilization values for Alberta are shown in the table below. Actual data are reported for 1990, 1994 and 1995. Projections are shown in the NRCan document for the year 2000 and at five year intervals to 2020. The historical data shows an increase in energy utilization in all sectors. The projections show a decrease in some sectors and continued growth in the energy demand in other sectors. There is no reason to doubt the validity of the historical data. The projections are of no value in interpreting past data and of questionable value regarding the future (due to concerns about the underlying methodologies).

Key energy utilization data from NRCan's Energy Outlook report are as follows (energy values are in Petajoules or Gigajoules):

Sector	*1990*	*1994*	*1995*	*Increase 1990 to 1995*
Industrial * PJ	*572*	*688*	*704*	*23.1%*
per Industrial RDP	*17.5*	*16.6*	*18.7*	*6.9%*
Commercial PJ	*141*	*148*	*159*	*12.5%*
per Commercial RDP	*2.1*	*2*	*2.1*	*0.0%*
Residential † PJ	*185*	*201*	*207*	*11.9%*
(GJ) per house	*190*	*193*	*193*	*2.0%*
Transportation ! PJ	*262*	*275*	*268*	*2.5%*
per million vehicles	*151*	*142*	*138*	*-8.6%*
All Sectors	*1160*	*1302*	*1339*	*15.4%*
(GJ) per Pop	*454*	*479*	*487*	*7.3%*

Notes: * Includes non-energy, e.g., petrochemical — feedstocks.
† Includes agriculture.
! Per million vehicle factor is based on a vehicle count from a separate NRCan source

If energy efficiency efforts are contributing to some reduction in energy utilization compared to what the utilization would be without those efforts, it is certainly not evident from the above figures. Reduced energy intensity in transportation (PJ per million vehicles) is probably due to improved fuel efficiency of replacement vehicles. The legitimate efficiency efforts by a small number of organizations and individuals appears overshadowed by the lack of such actions by the majority.

8.0 TRACKING MECHANISMS

Progress on energy efficiency in Alberta can be tracked in two ways. First, the energy efficiency database that was established as part of this study should be updated periodically (perhaps annually) so trends in activity level can be assessed. Some of the same key organizations can be surveyed again but some substitute organizations can be accommodated. Substitutes will allow for a broader sampling of more organizations and would shift the burden of participating in the study to different groups. Extra care needs to be applied to future database assessment to compensate for possible skewing of the results through a different set of participants. Continuing to use the same contacts in the utilities, government and the larger organizations will provide the needed continuity.

The second method of tracking energy efficiency is to continue to monitor actual energy utilization data on a gross basis and on an intensity or unit basis as was shown in the previous section, for each of the four energy utilization sectors and for a grand total. If energy efficiency efforts are to have a noticeable effect on energy utilization, the results of those efforts will eventually be reflected in the data. Sector growth may produce higher gross energy utilization but energy efficiency efforts should result in reduced intensity or unit factors if the efficiency efforts are meaningful and widespread.

Additional sources of data that could contribute to a tracking effort include Simon Fraser University for industrial energy utilization and McMaster University for building data. The McMaster group has already incorporated certain portions of Energy Bus energy audit data from Alberta and Manitoba. Other national data sources may be established for residential and transportation energy data at some point in the future.

The Canadian Association of Petroleum Producers have developed their own analysis of energy utilization in the oil and gas sector. No other industrial or business association has energy data that would contribute to a tracking analysis.

9.0 POTENTIAL SAVINGS

None of the individuals surveyed as part of this study offered any data or analysis on further potential energy savings for their sector. A few had opinions on possible savings at some of their own facilities and some of those opinions were probably based on audits and other specific studies. Considering that the majority of those who participated in the survey had already achieved some savings, the potential savings in organizations that have not implemented any efficiency projects is probably greater.

The only known comprehensive analysis of potential savings was conducted by the former Energy Efficiency Branch of Alberta Energy in 1990. The objective of that analysis was to determine to what extent carbon dioxide emissions in Alberta could be reduced if energy efficiency and energy substitutions were implemented on a widespread basis. Rough project economics were determined for a wide range of techniques and technologies that were considered applicable at representative facilities. The analysis was completed by determining the effect of implementing all cost effective techniques and technologies at all facilities that are part of Alberta's total energy utilization. The result was considered to be a measure of the "ultimate" emission reduction potential. The analysis showed that the following energy utilization reduction was possible (based on total energy utilization in Petajoules, including potential substitutions):

Sector	Energy Reduction Potential
Industrial	14.0%
Commercial	47.9%
Residential	31.1%
Transportation	20.4%
All Sectors	18.3%

A comparison of energy reduction potential values with the actual increase in energy utilization shown in the Energy Performance Indicators section demonstrates that very little of the potential for energy reduction has been achieved in Alberta.

10.0 CONCLUSIONS

Large companies within the process industries are already actively considering energy efficiency as part of their VCR commitment. This is the only sector that appears to be taking the emission reduction issue seriously. No assistance is required for those large companies other than some training and availability of technical information. Small companies are generally not as efficient and have a greater need for assistance. Initial assistance should be a sales effort to establish the importance of energy efficiency and the connection to emission reduction. The best way to approach these companies is through their respective industry associations.

Some companies within the manufacturing and lighting industries have implemented energy efficiency programs but have usually done so in isolation. There does not appear to be any organized effort within those industries to consider energy efficiency. The emission reduction topic is an "non-issue" based on the contacts that were made. There is some willingness to support collaborative efforts but no indication of serious commitment. These companies could use the same help as the smaller companies in the process industries. Some associations would like to assist their members but do not know how.

There are a number of good examples of successful energy efficiency efforts in some publicly funded institutions. However, those organizations that are known to have active programs represent only a small segment of that sector. The municipal sector presents an excellent role model for others in the public and private sectors. Some education facilities are also excellent models but no mechanism exists to share knowledge and experience. There is some potential for more activity in the health care sector but some key new initiatives are being held back. The provincial internal program has not been an effective role model for the private sector. Some private sector commercial organizations are pursuing energy cost saving opportunities but the proportion of firms with active programs is even less than in the public sector. Saving energy as either a cost-reduction strategy or for environmental reasons must compete with so many other issues. Some of the companies that operate apartment buildings are keen on using energy efficiency to save money but many potential projects are still not implemented due to a rapid payback requirement. Unlike industrial associations, business associations are basically not interested in the topic. A major sales effort is required. Fortunately, the energy efficiency consulting and supply sector is well informed about current energy efficiency activity and opportunities.

In their present structure, existing residential information programs can only hope to bring the conservation message to a small fraction of homeowners. The high cost of these programs and services is not justified. Privatization of former Provincial Government information services has not been successful. The Federal Government continues to increase spending on energy efficiency services but there is no indication of any benefit received by individual Albertans. Utility involvement in energy efficiency is confusing and is constantly changing. Some customers are sceptical of the role of utilities in the energy efficiency field.

The transportation sector is a large energy-consuming sector in which there is virtually no fuel-conservation activity. Even among those individuals surveyed who are responsible for large vehicle fleets, there was little interest in fuel conservation efforts. The Alberta Motor Association's role provides an excellent opportunity for meaningful action, at least in the automobile segment of the energy sector.

Resolution of the Energy Code issue would be beneficial for both the commercial building and housing sectors. The current debate between its supporters and opponents is delaying progress.

More effective tools and approaches need to be established for energy efficiency information and training. Study participants frequently commented on the need for good, basic information. Interactive videos could make a contribution, but the production effort needs to be well coordinated.

APPENDIX A

Energy Cost Divided By Value-Added Ratio For Selected Industries

(From a 1995 study by McC•A for a gas utility consortium)

Industry	$ Gas / $ Electricity per $ value added			Industry	$ Gas / $ Electricity per $ value added		
	High Ratio Industries				Low Ratio Industries		
PULP AND PAPER	0.07 dropping	/	0.19	SOLID WOOD	0.007	/	0.03
CHEMICALS	0.07	/	0.11	MEAT	0.01	/	0.02
OIL REFINING	0.08	/	0.06	DAIRY	0.02	/	0.04
CEMENT	0.07	/	0.07	BAKING	0.007	/	0.01
ELECTRICITY GENERAL	COAL	/	N/A	BEVERAGES	0.009	/	0.012
				FOUNDRIES	0.02	/	0.04
				GENERAL MFG.	<.01	/	<.015

APPENDIX B

Case Study List
(Case study ideas suggested by study participants)

INDUSTRIAL
- Sceptre Resources

COMMERCIAL
- Telus Building, South Edmonton
- Capitol Square Building
- Twin Atria Building
- Atkinson Building (Northwestern Utilities)
- Canadian Utilities Centre
- IPL Tower
- Lloydminster Public School Board
- Elk Island Public School Board
- St. Albert Protestant School Board
- Wapiti School Board (County of Grande Prairie)
- Grant MacEwan Community College
- University of Alberta
- University of Alberta Hospital
- Caritas Health Group
- Alberta Public Works Supply and Services
- City of Edmonton
- Town of Drumheller
- ARE Architects

RESIDENTIAL
- Envirohome

TRANSPORTATION
- (none provided)